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The utility of the Valuing Questionnaire in Chronic Pain

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Abstract

Existing measures of valued living present several limitations: 1) focus on values in life domains, 2) potentially overlap with satisfaction with life, or 3) do not measure obstacles to valued living. The Valuing Questionnaire (VQ) is a 10-item tool of valued living, able to measure Progress in and Obstructions to valued living. This study tests VQ's measurement invariance in a sample of women with Chronic Pain (CP) (N=231) and from the general population (N=268), its temporal stability in CP (6-months) (N =117) and its incremental validity in a sample of men and women from the general population (N=169). Results confirmed the VQ's two-factor structure, as well as its measurement invariance. Also, the VQ was temporally stable (6-months) in CP. Both factors (Progress and Obstruction) were significantly correlated in the expected directions with cognitive fusion, mindful awareness, self-compassion, depressive, anxiety and stress symptoms, and quality of life. VQ Obstruction showed incremental validity, as it significantly predicted depression, anxiety and stress symptoms above and beyond psychological inflexibility and other measures of valued living. The current study shows the VQ's applicability to CP, and provides additional empirical support for its convergent, concurrent, and incremental validity, as well as its temporal stability.

Keywords

Valuing Questionnaire; Acceptance and Commitment Therapy; Assessment; Values

INTRODUCTION

Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2012) is an increasingly empirically validated psychological approach (see A-Tjak, Davis, Morina, Powers, Smits, & Emmelkamp, 2015; Atkins et al., 2017; Graham, Gouick, Krahé, & Gillanders, 2016) according to which psychological suffering results from the entanglement with internal experiences and from the unwillingness to have them, which in turn leads to avoidant behaviors and a decrease in engaging in valued-based actions (e.g. Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Thus, ACT's overall therapeutic goal is to promote willingness to experience difficult internal events (e.g. thoughts, emotions, physical sensations) when doing so leads to engaging in behaviors that promote a meaningful and fulfilling life guided by personal values (e.g. Hayes, Levin, Plumb-Villardaga, Villatte, & Pistorello, 2013). Values are defined in ACT literature as ongoing, dynamic patterns of freely chosen, purposeful behavior, in which the predominant reinforcement for the behavior is inherent in engaging in the behavior itself (Wilson & Murrell, 2004). Unlike goals, values can never be achieved per se, though they guide action and permeate moment-by-moment behaviors, as well as intrinsically reinforce behavioral patterns congruent with those values (Wilson & Dufrene, 2009).

Promoting values-congruent actions has a central role in ACT (Wilson & Murrell, 2004), and some studies have suggested its specific benefits in psychological interventions. Although following a somewhat different conceptualization, studies suggest that affirming personal values reduces physiological stress (Creswell Welch, Taylor, Sherman, Gruenewald,

& Mann, 2005) and increases school performance in minority groups (Cohen, Garcia, Apfel, & Master, 2006). To our knowledge, most empirical studies on values have been conducted in chronic pain patients (CP). Data suggest that values-based action is retrospectively associated with better emotional, physical, and social functioning (e.g. McCracken, 2013; McCracken & Vowles, 2014; McCracken & Yang, 2006), and prospectively (18.5 weeks) predicts functioning in CP patients seeking treatment (McCracken & Vowles, 2008). Additionally, changes in valued-based actions after an ACT intervention for CP was moderately associated with changes in depression and anxiety (Vowles & McCracken, 2008), including in a three-year follow-up period (Vowles, McCracken, & O'Brien, 2013)

The key role of values in ACT raises the necessity of developing a psychometrically robust and transdiagnostic measure of values. Although there have been meritorious efforts to develop sound measures of valued living, those present limitations that hinder their wide applicability in different settings, and some have argued a general lack of comprehensive psychometric analyses (Åkerblom, Perrin, Fischer, & McCracken, 2017). The Valued Living Questionnaire (VLQ; Wilson, Sandoz, Kitchens, & Roberts, 2010) presents ten life domains, which participants rate according to how important the value is, and how consistently they have lived towards that value. Following a similar design, in the Values Bull's Eye (Lundgren, Luoma, Dahl, Strosahl, & Melin, 2012) participants write a value associated with each of four life domains, and choose how well they have lived according to each value by marking in a "target" (the closer to "bull's eye", the more successfully they have lived in congruence with personal values in that life domain). Similarly, the Personal Values Questionnaire (PVQ; Ciarrochi, Fisher, & Lane, 2010) requires participants to write a brief statement of their values in each of nine life domains, and assesses motivational consequences, importance, success, commitment to act accordingly and willingness to make progress in living out that value. Although these measures are clinically useful, they present the limitation of either not

providing a global score of overall valued living (if each life domain is considered separately), or to provide one that is not a rigorous depiction of overall valued living. For example, it does not account for developmental stages in which although a value associated to a life domain – e.g. parenthood – is regarded as important, one is nonetheless unable to act consistently at that moment in life. Additionally, one might engage in valued living in one life domain, but not in other, and thus the total score does not necessarily present an accurate depiction of overall valued living.

Following a similar design, the Chronic Pain Values Inventory (CPVI; McCracken & Yang, 2006) was developed to measure valued living in six life domains (in each, participants rate their values' importance and how successfully they have been living accordingly to those values), with an additional introduction that focusses on CP. Although the items' content is not CP-specific, the introduction instructs participants to focus on pain-related barriers to valued living, which makes CPVI a content-specific measure that is less applicable to other populations and clinical settings.

Perhaps the closest measure of overall valued living (not population-specific nor divided by life domains) is the Engaged Living Scale (ELS; Trompetter, Klooster, Schreurs, Fledderus, Westerhof, & Bohlmeijer, 2013). ELS is a 16-item measure, recently proposed to be psychometrically sound in its shorter 9-item version (Trindade et al., 2015). It assesses two domains: valued living and life fulfilment. Although this is a robust measure of valued living, its high correlation ($r = .74$) with satisfaction with life (Graham, Gouick, Ferreira, & Gillanders, 2016) suggests that ELS might be measuring a construct more related to life satisfaction than valued-living processes. Indeed, although ELS significantly predicts psychopathological symptoms and well-being above and beyond other ACT processes (Trompetter et al., 2013), its incremental validity over other valued living measures remains

unexplored. Additionally, ELS is a positively-oriented measure, which limits the possibility of conducting accurate studies on the impact of experiencing obstacles to valued living.

The Valuing Questionnaire (VQ; Smout, Davies, Burns, & Christie, 2014) is a 10-item instrument developed to assess overall valued living, with the advantage of grasping the nuances of valued living, e.g. its evolving moment-to-moment experience (“I continued to get better at being the kind of person I want to be”), engagement with valued actions despite internal experiences (“I worked toward my goals even if I didn’t feel motivated to”) and a sense of meaningfulness (“I was proud about how I lived my life”). Additionally, besides tapping into *progress* in valued living, the VQ measures explicit ACT-congruent *obstacles* to valued living (e.g. “Difficult thoughts, feelings or memories got in the way of what I really wanted to do”, “I was basically on “auto-pilot” most of the time”). Although the VQ has shown to be psychometrically valid (Smout et al., 2014), a number of features are yet to be established: 1) its incremental validity compared to other measures of valued living (e.g. ELS); 2) its temporal stability; 3) its association with other ACT core processes (e.g. cognitive fusion) and ACT-related processes (self-compassion) (Yadavaia, Hayes, & Vilardaga, 2014; Luoma & Platt, 2015) 4) and its psychometric performance across a broader range of samples.

The current study aims to expand the knowledge on the validity of VQ. Specifically, this study aims to 1) validate the VQ in a sample of CP patients; 2) test its measurement invariance between a CP sample and a sample from the general population; 3) to explore its incremental validity; 4) test its temporal stability in a 6-month period.

METHOD

Participants

The current study was conducted in three independent samples: a sample composed of women suffering from CP recruited online (Sample 1; $N = 231$), a sample of men and women from the general population (Sample 2; $N = 340$), and a sample of men and women from the

general population recruited online exclusively for testing incremental validity (Sample 3; $N = 169$). Additionally, in order to have gender-matched samples to perform confirmatory and multi-group factor analyses, a subsample of Sample 2 composed of women only was used (subsample 2; $N = 268$). Finally, in order to assess temporal stability, a subsample of Sample 1 composed of participants who completed a 6-month second assessment was used (subsample 1; $N = 117$). This is part of a larger project that aims to prospectively study the temporal association between several psychological processes in women with chronic pain. See Table 1 for more information on samples' characterization, analyses and measures.

Inclusion criteria for CP (Sample 1): a) having constant or sporadic pain for more than three months; b) being 18 years of age or older; c) being able to read and write Portuguese; d) having access to an online device in order to complete the battery of questionnaires. Inclusion criteria for the general population (Sample 2 and 3): 18 years of age or older; b) able to read and write Portuguese.

Procedure

Sample 1 was collected through an online protocol advertised in three nationwide associations for people with CP. After agreeing to collaborate with the study, the directors of these associations advertised our study through the associations' mailing lists and contacts, by providing the study link. The protocol was accessed by 479 participants, of which 246 completed the battery of questionnaires (51%). Fifteen participants were excluded: nine men and six Brazilian women, in order to have a gender and nationality balanced sample. Information regarding the aims of the study, the target population, the voluntary nature of participation and the confidentiality of data was provided, after which participants gave informed consent. Data was collected between February and April of 2017

Sample 2 was a mixed convenience sample from the general population that includes students of the university and employees of local companies (one textile factory and one

software company). Company managers were contacted and authorized two graduate students to come to the companies' facilities. Informed consents were given and participants responded in the workplace. Recruitment was between October 2016 and May 2017.

Sample 3 was composed of participants from the general population, collected online via snowball sampling, through facebook of colleagues and acquaintances who forward the study link to their contacts. From the 204 participants who accessed the online protocol, 169 completed the battery of questionnaires, from September 2017 to November 2017.

The current study was conducted after the approval from the Ethics Committee of the Faculty of Psychology and Educational Sciences of University of Coimbra, Portugal (January 12th 2017). The current study is part of a larger one that aims to explore the role of several psychological processes in the etiology of psychopathological symptoms in individuals with CP.

Translation of VQ into Portuguese

The translation process was conducted according to established guidelines (World Health Organization, 2017). The first author, fluent in English and Portuguese (S.C.) translated VQ into Portuguese. Then, a colleague not involved in the study back-translated the items into English. A co-author of the current study and ACT expert (P.C.) assessed the accuracy of the items, and changes were made accordingly. The translated instrument was then tested in college students. No changes were carried out afterwards. The final version was included in the study protocol.

Measures

In addition to VQ (Smout et al., 2014), the psychometric analyses and validation was conducted with a battery of the following questionnaires, all translated and validated in the Portuguese population:

Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014; Pinto-Gouveia, Dinis, Gregório, & Pinto, 2018) is a 7-item questionnaire that assesses the degree to which participants are entangled with and dominated by thoughts and beliefs (i.e. cognitive fusion), using a 7-point Likert-like scale (1= "never true"; 7 "always true"). In the current study, CFQ showed excellent internal consistency ($\alpha = .94$).

Chronic Pain Acceptance Questionnaire – 8 (CPAQ; Fish, McGuire, Hogan, Morrison, Stewart, 2010) is an 8-items instrument that measures pain willingness and activity engagement, and provides us a global measure of pain acceptance, assessed on a 7-point scale (0 = never true; 6 = always true). In the current study, CPAQ had an acceptable internal consistency ($\alpha = .69$).

Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003; Gregório & Pinto-Gouveia, 2013) is a 15-item measure of attention and awareness of present moment, using a 6-point Likert scale (1 = almost always; 6 = almost never). Higher scores mean higher mindful awareness. The current study found good values of Chronbach alpha ($\alpha = .88$).

Self-Compassion Scale-short form (SCS; Raes, Pommier, Neff, & Van Gucht, 2013; Castilho, Pinto-Gouveia, & Duarte, 2015) is a 12-item version of the longer 24-item SCS (Neff, 2003) that measures self-compassion on a 5-point Likert self-report scale (1 = almost never; to 5 = almost always). New data suggests that SCS can be used as a two-factor scale: one assessing a *self-compassionate* attitude (a composite of self-kindness, common humanity and mindfulness) and one measuring a *self-critical* attitude (that results from the sum of self-judgment, isolation and over-identification) (e.g. López et al., 2015; Costa, Marôco, Pinto-Gouveia, Ferreira, & Castilho, 2016). The current study followed this factor structure, and is only focused on the self-compassion factor, which will be used throughout this study as self-compassion. The current study found acceptable internal consistency ($\alpha = .76$).

Acceptance and Action Questionnaire – II (AAQ-II; Bond et al., 2011; Pinto-Gouveia, Gregório, Dinis & Xavier, 2012) is a 7-item measure of psychological inflexibility, i.e., “the rigid dominance of psychological reactions over chosen values and contingencies in guiding action” (Bond et al. 2011, p. 678). AAQ-II uses a 7-point scale to assess psychological inflexibility, in which higher scores mean higher psychological inflexibility. In the current study the AAQ-II had acceptable internal consistency ($\alpha = .76$).

Valued Living Questionnaire (VLQ; Wilson et al., 2010) is a 2-part (10 life domains each) measure of valued living assessed on a 10-point scale. The first part measures how important each life domain is, and the second part assesses how consistently a person has acted towards each domain in the last week. The current study found acceptable internal consistency (Importance: $\alpha = .76$; Consistency: $\alpha = .78$).

Engaged Living Scale – short form (ELS; Trompetter et al., 2013; Trindade et al., 2015) is a 9-item instrument that measures engagement in valued living on a 5-point Likert scale (1 = completely disagree; 5 = completely agree). It contains two dimensions: valued living and life fulfillment. The current study found internal consistencies of $\alpha = .71$ for valued living, and $\alpha = .87$ for life fulfillment.

World Health Organization Quality of Life – Bref (WHOQOL; Harper & Power, 1998; Vaz Serra et al., 2006) is a well-known 26-item measure of quality of life that assesses 4 dimensions of quality of life (physical, psychological, social relations, environment). The current study found good or acceptable internal consistencies for all subscales (physical: $\alpha = .74$; psychological: $\alpha = .83$; social relations: $\alpha = .67$; environment: $\alpha = .82$).

Depression, Anxiety and Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995; Pais-Ribeiro, Honrado, & Leal, 2004) is a widely used 21-item self-report measure of depression, anxiety and stress, that uses a 4-point scale (0 = did not apply to me at all; 3 = applied to me very much or most of the time). The current study found good internal

consistencies in all samples used (samples 1, 2 and 3) for all subscales (Depression: from $\alpha = .85$ to $\alpha = .93$; Anxiety: from $\alpha = .84$ to $\alpha = .86$; Stress: from $\alpha = .89$ to $\alpha = .92$)

Data analysis

All statistical analyses were conducted using SPSS statistics software (IBM corp., 2011) and in AMOS software Arbuckle, 2006).

In order to examine the adequacy of data, preliminary data analyses were conducted (Skewness and Kurtosis; Multicollinearity; Mahalanobis distance statistic for outlier analysis). Confirmatory factor analysis was then conducted in a total sample composed of women with CP (Sample 1) and women from the general population (Subsample 2), with Maximum Likelihood (ML) as the estimation method (Brown, 2006; Iacobucci, 2010; Kline, 2005; Schermelleh-Engel, Moosbrugger, & Müller, 2003). Following recommendations by Brown (2006) and by Kline (2005) model fit was assessed in accordance to several goodness-of-fit indices and respective cut-off recommendations: Chi-Square (χ^2), Normed Chi-Square ($\chi^2/\text{d.f.}$), Comparative Fit Index ($\text{CFI} \geq .90$, acceptable, and $\geq .95$, desirable; Hu & Bentler, 1999), Tucker-Lewis Index ($\text{TLI} \geq .90$, acceptable, and $\geq .95$, desirable; Hu & Bentler, 1999), Goodness of Fit Index ($\text{GFI} \geq .90$, good, and $\geq .95$, desirable; Jöreskog & Sörbom, 1996), Root Mean Square Error of Approximation ($\text{RMSEA} \leq .05$, good fit; $\leq .08$, acceptable fit; $\geq .10$, poor fit; Brown, 2006; Kline, 2005) using a 90% confidence interval. Local model fit was assessed through items' standardized factor loadings (λ) and individual reliability (R^2), where $\lambda \geq .50$ can be interpreted as the model having factorial validity, and $R^2 \geq .25$ as the items having internal reliability (Hair, Anderson, Tatham, & Black, 1998).

Reliability was assessed through Cronbach's alphas, where $\alpha > .70$ were considered acceptable (Field, 2013), and considering item-total correlations $> .50$ (Nunnally, 1978; Tabachnick & Fidell, 2007). Additionally, composite reliability and average variance

extracted (AVE) were estimated. Acceptable values of reliability were $AVE \geq .50$ and composite reliability $\geq .70$ (Hair et al., 1998).

Measurement invariance of VQ was assessed through a multi-group factor analysis, in which the factor structure invariance of VQ between both samples (Sample 1 and Subsample 2) was assessed by comparing the unconstrained model (with free structural parameter coefficients) and the equality constrained model (with parameters equally constrained across groups). Chi-square difference test was used to assess difference between groups (Byrne, 2010).

Convergent validity analyses (Sample 2) were conducted through correlation analyses between VQ and other related constructs, and concurrent validity analyses (Sample 3) were conducted by correlating VQ with other measures of the same construct (Cohen, Cohen, West, & Aiken, 2003).

Temporal stability of VQ was conducted in a subset of women with CP who responded to a second assessment moment (6-months after first assessment) (Subsample 1). Temporal stability was assessed through t-test analyses for paired samples, which compared scores in first and second moments of assessment. Additionally, Pearson's correlations were conducted in order to assess the significance of association between the two assessment moments, and these associations were also explored through partial correlations in which changes in depression, anxiety and stress were controlled for. Also, we conducted bivariate correlation analyses to explore associations between changes in VQ subscales, as well as between VQ subscales and variables in study.

Incremental validity was assessed in an independent sample from the general population (Sample 3), by conducting hierarchical regressions models in which depressive, anxiety and stress symptoms are predicted by progressively adding other predictors in the model: 1)

AAQ-II; 2) VLQ; 3) ELS; 4) VQ. This allows the testing of the additional variance explained by VQ in the model (Haynes & Lench, 2003).

RESULTS

Preliminary Data Analyses

Preliminary analysis showed acceptable skewness and kurtosis values ($SK < |3|$ and $Ku < |8-10|$) and $VIF < 5$ (Kline, 2005), thus suggesting normal distribution. Although the Mahalanobis distance statistic (D^2) indicated the presence of eleven multivariate outliers, no univariate outliers were detected in Sample 1. Additionally, Sample 2 had three univariate outliers. Two univariate outliers were found in Sample 3. We carried out the analyses without the outliers, and there were no significant changes in results. Thus, the decision to retain outliers was based on the assumption that maintaining outliers allows for data to be more likely representative of the variability of the population under study (Kline, 2005; Tabachnick & Fidell, 2007).

Confirmatory Factor Analysis

Results from CFA confirmed the two-factor structure of VQ. The model (see Figure 1) showed a good fit to the data ($\chi^2(34) = 107.724$; $p < 0.001$; $\chi^2/df = 3.168$; $GFI = .958$; $CFI = .965$; $TLI = .953$; $RMSEA = .066$ [90% CI .052;.080], $p = .029$).

It is worth mentioning that although chi-square remained statistically significant, chi-square is sensitive to sample size, and tends to be significant in large samples (Schermelehen-Engel, Moosbrugger, & Müller, 2003). All items presented good local model fit, where standardized factor loadings were statistically significant ($p < .001$), ranging from $\lambda = .56$ (item 3) to $\lambda = .81$ (item 4). Also, squared multiple correlations ranged from $R^2 = .31$ (item 3) to $R^2 = .65$ (item 4). As expected, both factors were moderately and negatively correlated ($r = -.50$).

Reliability Analyses

Both factors of VQ showed good composite reliability (VQ-Progress = .86; VQ-Obstruction = .89), and average variance extracted (VQ-Progress = .69; VQ-Obstruction = .62). This suggests that items do reflect the latent constructs.

Additionally, results from internal consistency analyses are depicted in Table 2.

Results from corrected item-total correlations and Chronbach's alpha if item deleted showed that all items had item-total correlations above .30. Moreover, all items significantly contributed to the internal consistency of its factor, with the exception of item 3.

Nevertheless, it was decided to maintain this item as it presents good local model fit.

Multi-group Factor Analysis

To test measurement invariance of VQ between a sample of CP patients (Sample 1) and a general population sample (Subsample 2), a multi-group analysis was conducted. Measurement invariance is corroborated by comparing the unconstrained model with a constrain model in which parameters are equally constrained across groups (Byrne, 2010). The model presented good model fit for both groups ($\chi^2(68) = 155.405$; $p < 0.001$; $\chi^2/df = 2.285$; GFI = .941; CFI = .956; TLI = .942; RMSEA = .051 [90%CI .040;.061], $p = .431$). Moreover, the measurement invariance across groups for measurement weights (equal factor loadings) was also confirmed ($\chi^2(8) = 6.019$, $p = .645$).

Correlation analysis

Results from correlation analysis showed VQ-obstruction and VQ-Progress to be significantly correlated (and in the expected directions) with all variables in study (see Table 3).

VQ-Obstruction was positively correlated with cognitive fusion, depression, anxiety and stress, and negatively associated with mindful awareness, self-compassion and quality of life (all subscales). Conversely, VQ-Progress was positive and significantly correlated with

mindful awareness, self-compassion and quality of life (all subscales), and negatively correlated with cognitive fusion, depression, anxiety and stress. Worth noting is that the highest magnitude of correlation with VQ-Obstruction was cognitive fusion, while with VQ-Progress was psychological health quality of life. Finally, VQ-Obstruction and VQ-Progress were negative and significantly correlated.

Also, VQ-Obstruction was negatively correlated with other measures of values (VLQ-consistency, ELS-valued living, ELS-life fulfilment), which VQ-progress was positively correlated with. Of note is that VQ-Obstruction was not significantly associated with the importance attributed to a value in a life domain (VLQ-importance).

Temporal stability and associations between changes over a 6-month period

Temporal stability analysis was conducted in a sample of participants with CP (Subsample 1; $N = 117$) who completed the same battery after a 6-month interval (50.65% retention). Results from correlation analyses showed positive and significant associations between the two assessment moments of the VQ-Obstruction ($r = .62, p < .001$) and the VQ-Progress ($r = .52, p < .001$). These results remained significant even when simultaneously controlling for changes in depression, anxiety and stress assessed over the same period: VQ-Obstruction ($r = .64, p < .001$) and the VQ-Progress ($r = .54, p < .001$). Additionally, t-tests (paired samples) were conducted and did not show differences between first and second assessments for VQ-Obstruction ($t_{(116)} = .486, p = .628, ns$) and VQ-Progress ($t_{(116)} = 1.113, p = .268, ns$).

Correlation analyses showed that, in a 6-month period, changes in VQ-Progress were not significantly correlated with changes in VQ-Obstacles ($r = -.062, p = .482$). Changes in VQ-Progress were significantly associated with changes in acceptance of pain ($r = .267, p = .002$) and self-compassion ($r = .218, p = .012$), but not with changes in mindful awareness ($r = .072, p = .409$), cognitive fusion ($r = -.162, p = .062$), depression ($r = -.156, p = .073$),

anxiety ($r = .016, p = .858$) and stress ($r = -.095, p = .279$). Changes in VQ-Obstruction were significantly correlated with changes in cognitive fusion ($r = .291, p = .001$), acceptance of pain ($r = -.118, p = .038$), mindful awareness ($r = -.208, p = .016$), depression ($r = .290, p = .001$) and stress ($r = .223, p = .10$), but not with changes in self-compassion ($r = .044, p = .612$) and anxiety ($r = .137, p = .117$).

Incremental Validity

Hierarchical regressions were conducted in a sample from the general population (Sample 3; $N = 169$) in order to test the incremental validity of VQ. Depression, anxiety and stress subscales of DASS-21 were predicted by progressively adding to the model predictors as follows: Step 1) AAQ-II; Step 2) VLQ-Importance and VLQ-Consistency; Step 3) ELS-Valued living and ELS-Life fulfilment; Step 4) VQ-Obstruction and VQ-Progress (see results in Table 4).

Results show that the VQ accounted for unique significant variance explained by the model (3% of depression and 4% of stress), beyond psychological (in)flexibility (AAQ-II) and other measures of values (VLQ and ELS), except anxiety. Specifically regarding stress, when VQ is added to the model, ELS-Life fulfilment does not contribute significantly to the model ($\beta = -.16, p = .073$). These results suggest that VQ, particularly the Obstruction subscale, is not merely measuring psychological (in)flexibility, and it is not redundant to other measures of values-related constructs as it adds predictive variance of depression and stress.

DISCUSSION

Promoting the engagement in activities that are meaningful and values-oriented despite feeling pain is a central feature of acceptance-based approaches to CP (McCracken, 2013), and is associated with better mental and physical health indicators (McCracken & Yang, 2006; McCracken & Vowles, 2008; Vowles & McCracken, 2008; Vowles, McCracken, O'Brien, 2013). Thus, the development of robust measures of valued living that are able to

assess both progress in valued living as well as experiencing obstacles to doing so, is a crucial endeavor to CP clinical work and research. The VQ (Smout et al., 2014) was developed to overcome the limitations of measures of valued living that depend on values that are specific to life domains, rather than overall valued living. In addition to being psychometrically robust, VQ is the first instrument of valued living that includes items that seem to efficiently tap into the internal experiences (e.g. thoughts, emotions, physical sensations) that potentially produce obstructions to valued living, which are crucial to include in research on values and committed action in CP (McCracken & Vowles, 2014). Nevertheless, to our knowledge VQ's psychometric properties and factor structure have never been tested in participants with CP. Furthermore, no studies have compared its factor structure between CP samples and a sample from the general population. Additionally, there is a lack of knowledge on its temporal stability, as well as its association with central contextual-behavioral related constructs (e.g. cognitive fusion, self-compassion). Finally, although it is known that VQ is not redundant when compared to measures of valued living structured in life-domains, there is no data comparing VQ to another measure of overall valued living (i.e. ELS). The current study presented data that tested each of these measurement properties.

Results from confirmatory factor analysis showed a good model fit, which confirmed the two-factor structure found in the original development study (Smout et al., 2014). In addition, the VQ was found to be internally consistent at the subscale level. VQ provides the advantage of clearly measuring two different routes of underlying processes: one related to psychologically flexible processes (Progress) and other that involves psychologically inflexible processes (Obstruction). This overcomes the potential inaccurate scores of measures that differentiate values in life-domains and then use composites that do not necessarily reflect overall valued living (Åkerblom et al., 2017; Smout et al., 2014).

Also, results from multi-group factor analysis showed that VQ's structure presents good model fit in a sample of women with CP, and in the general population, and that its structure is invariant across groups. These results suggest that the use of VQ in comparative studies that explore values and valued living in CP and the general population samples is adequate.

Results from correlation analyses showed a pattern of associations in line with previous literature (Hayes et al., 2012; Hayes et al., 2013). As expected, Progress was positively associated with all domains of quality of life (WHOQOL) and with mindful awareness (MAAS) and self-compassion (SCS), while negatively associated with cognitive fusion (CFQ) and psychopathological symptoms (depression, anxiety and stress; DASS-21). Also in line with predictions, these associations were inverse for Obstruction. It is worth noting that Obstruction presented a stronger (positive) association with cognitive fusion than Progress (negatively) did. This seems to suggest that the Obstruction scale is able to tap into psychological processes that result in obstacles to engaging in values-guided actions, such as being entangled with internal experiences. Interestingly, MAAS was more strongly (negatively) related to Obstruction than (positively) with Progress, which seems to suggest that present moment awareness is more closely associated with reducing obstacles, than it is in making progress towards values. On the other hand, SCS is more strongly related to Progress than with Obstruction, which seems to indicate that engaging in a kind and warm self-to-self relating is significantly involved in valued living.

Adding to the original study (Smout et al., 2014), results suggest that VQ is a temporally stable measure in CP, at least up to a six-month interval. Additionally, by conducting partial correlation analyses while controlling for changes in symptoms of depression, anxiety and stress, results suggested that the significant associations between the two VQ assessment moments are independent from changes in depressive, anxiety and stress

symptoms in the same period. Interestingly, changes in Progress were significantly related to self-compassion, but changes in Obstruction were not. This is an interesting result, as it seems to suggest that while establishing a kind and warm self-to-self relating is an important factor in moving towards valued-based actions, it seems to not be particularly relevant to experiencing less obstructions to valued living. This seems to corroborate the notion that self-compassion, more than an internal emotional experience, is a motivational process (Gilbert et al., 2017) that might be relevant for progress in engaging in valued-based actions.

Also, results showed that VQ adds unique variance in a model predicting psychopathological symptoms: VQ (Obstruction, but not Progress) significantly predicts depressive and stress symptoms (but not anxiety) above and beyond psychological inflexibility (AAQ-II) and other measures of valued living (VLQ and ELS). This is a particularly hard test for the VQ. For example, in predicting depression, when the VQ was added to the equation, 50% of the variance in depression was already explained, leaving little room for the VQ to capture further variance. The fact that it did add small but significant proportions of variance explained is evidence of its relevance to future predictive and modelling studies.

The current study should not be interpreted without considering its limitations. The current study aimed to explore VQ's properties in CP, thus the generalization of these results to other clinical and medical conditions is unwarranted. Additionally, although both the general population samples presented diverse levels of education, the majority had at least a high school certificate, which suggests the need for replicating these findings in samples with less education. Furthermore, the current study did not test the VQ's sensitivity to values focused intervention, an important measurement property that is yet to be demonstrated. Also, more studies on the incremental validity of VQ are needed, particularly regarding the prediction of positive outcomes (e.g. quality of life). It is not surprising that VQ-Obstruction

was a stronger predictor of depressive, anxiety and stress symptoms as these are more significantly associated. Further evidence is needed on the incremental validity of VQ-Progress regarding positive outcomes. In addition, although incremental validity and correlations were performed in samples with men and women, factor structure analyses were performed in women-only samples. Thus, generalizing the current findings on VQ's factor structure to men with CP is unwarranted. Finally, the validity of VQ was tested predominantly with a cross-sectional self-report methodology (except temporal stability), which does not allow causal relations to be inferred. Future studies should further knowledge of the VQ by conducting experimental studies that relate the items (and latent factors) with other variables following an experimental task using behavioral measures (e.g. persisting in a given task despite pain-eliciting stimuli).

In conclusion, VQ is a reliable and valid measure of valued living, and the first one to measure separately progress/engaging in valued living, and experiencing obstacles to proceeding with living meaningfully. This is an improvement on the measurement of valued living, which is a key process in the psychological (in)flexibility model (Hayes et al., 2012), thus crucial to assess clinically significant changes following acceptance-based interventions. Indeed, VQ was significantly correlated with core ACT-related constructs (e.g. cognitive fusion, mindful awareness, self-compassion, psychological inflexibility). Additionally, VQ is a valid and temporally stable measure of overall valued living in CP, and can be used in comparative studies with CP and the general population samples, as it presented measurement invariance.

In addition to providing evidence of the psychometric robustness of the VQ, as well as its utility in clinical and research fields of CP, the current study contributes to the ongoing discussion and empirical validity of the psychological (in)flexibility model (Hayes et al., 2012). By providing evidence of its measurement invariance, this study tentatively

corroborates the assumption that progressing towards or experiencing obstacles in living a meaningful and valued life is not only transdiagnostic, but also a key underlying factor in both human thriving and suffering (Wilson & Murrell, 2004). Indeed, the VQ is a theory-built measure of valued living, in which obstacles to valued living are conceptualized as internal experiences of getting hooked by thoughts, emotions and physical sensations, as well as the unwillingness to experience those that result in attempts to avoid them (Hayes et al., 2006), as can be corroborated by the high correlation between cognitive fusion (CFQ) and obstacles to valued living (VQ-Obstruction). Finally, our data tentatively corroborate the postulate that although values and valued living are a key process in psychological (in)flexibility model (Hayes et al., 2013), values are a distinct and non-overlapping process beyond psychological (in)flexibility and other psychological processes key or related to the model (e.g. contact with present moment, self-compassion). Future studies should continue pushing forward the empirical status of the model by testing the distinctiveness and overlap of all core psychological (in)flexibility processes, perhaps building a factor structure that would test loadings in more than one process, and thus exploring latent factors (processes), which would corroborate and/or reconceptualize the model itself.

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Figures:

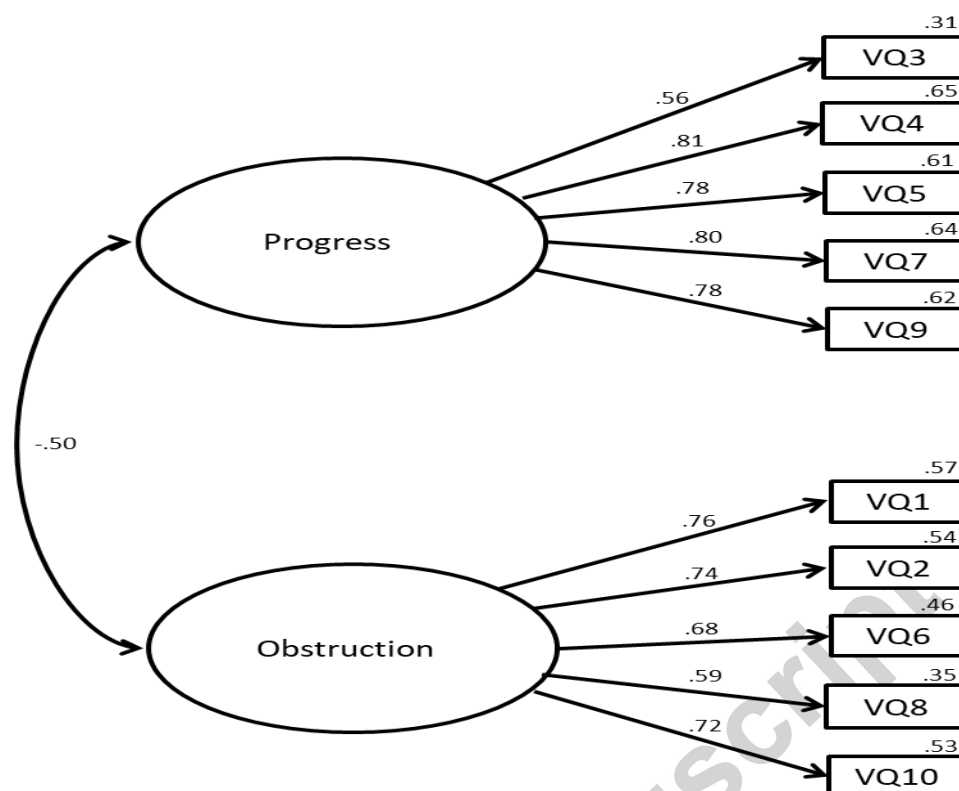


Fig. 1.

Confirmatory Factor Analysis of the two-factor of VQ ($N = 499$). Standardized coefficients are shown; all paths are statistically significant ($p < .001$).

Tables

Table 1. Sample, sample size, characterization, analyses and instruments.

Sample	N	Characterization	Analyses	Instruments
Sample 1	231	Women with CP; mean age $M = 48.51$ ($SD = 10.89$); the majority were married ($n = 150$; 64.9%), with a bachelor's degree ($n = 88$; 38.1%) or high school certificate ($n = 73$; 31.6%).	CFA, Multi-group & Reliability	VQ
Subsample 2	268	Women from Sample 2; mean age $M = 24.87$ ($SD = 11.00$); the majority were single ($n = 227$; 84.7%) with a high school certificate ($n = 185$; 69.0%).		
Sample 2	340	Women ($n = 268$; 78.8%) and men ($n = 72$; 21.2%) from the general population; mean age $M = 26.30$ ($SD = 11.79$), the majority were single ($n = 274$; 80.8%) and had a high school certificate ($n = 217$; 63.8%).	Convergent validity	CFQ, MAAS, VQ, SCS, DASS-21, WHOQOL
Subsample 1	117	Participants from Sample 1 who completed a second assessment moment (6-months); $M = 47.79$ ($SD = 10.45$); the majority were married ($n = 81$; 69.2%) and had a bachelor's degree ($n = 50$; 42.7%) or high school certificate ($n = 36$; 30.8%).	Temporal stability & Correlations over time	VQ, DASS-21, CFQ, CPAQ, MAAS, SCS
Sample 3	169	Women ($n = 111$; 65.7%) and men ($n = 58$; 34.3%) from the general population; mean age $M = 32.76$ ($SD = 6.77$), the majority were single ($n = 98$; 58.0%) and had a master's ($n = 79$; 46.7%) or a bachelor's degree ($n = 32$; 18.9%). .	Incremental & Concurrent validities	AAQ-II, VQ, VLQ, ELS, DASS-21

Note. CP = Chronic Pain; CFA = Confirmatory Factor Analysis; VQ = Valuing Questionnaire; CFQ = Cognitive Fusion Questionnaire; CPAQ = Chronic Pain Acceptance Questionnaire; MAAS = Mindful Attention Awareness Scale; SCS = Self Compassion Scale; DASS-21 = Depression, Anxiety, Stress Scale; AAQ-II = Acceptance and Action

Questionnaire; VLQ = Valued Living Questionnaire; ELS = Engaged Living Scale;
WHOQOL = World Health Organization Quality of Life.

Table 2 Means (*M*), standard deviations (*SD*), corrected item-total correlations, ordinal Cronbach's alpha and ordinal Cronbach's alpha if item deleted for Valuing Questionnaire (VQ) and its dimensions (*N* = 499)

Items	<i>M</i>	<i>SD</i>	Corrected item-total <i>r</i>	Cronbach's alpha
VQ-Progress				.86
3. worked toward my goals even if I didn't feel motivated to	4.01	1.42	.53	.87
4. I was proud about how I lived my life	4.03	1.54	.73	.82
5. I made progress in the areas of my life I care most about	3.86	1.54	.71	.83
7. I continued to get better at being the kind of person I want to be	4.11	1.47	.72	.83
9. I felt like I had a purpose in life	4.10	1.61	.72	.82
VQ-Obstruction				.83
1. I spent a lot of time thinking about the past or future, rather than being engaged in activities that mattered to me	2.84	1.87	.68	.77
2. I was basically on "auto-pilot" most of the time	2.35	1.75	.65	.78
6. Difficult thoughts, feelings or memories got in the way of what I really wanted to do	3.20	1.81	.61	.80
8. When things didn't go according to plan, I gave up easily	1.83	1.61	.53	.82
10. It seemed like I was just "going through the motions" rather than focusing on what was important to me	2.36	1.79	.64	.79

Table 3. *Pearson product-moment correlation coefficients between study's variables by sample.*

Measures	VQ Progress	VQ Obstruction
Convergent validity (Sample 2; $N = 340$)		
VQ Obstruction	-.44***	-
CFQ	-.37***	.65***
MAAS	.29***	-.43***
SCS	.45***	-.36***
DASS-21 Depression	-.44***	.62***
DASS-21 Anxiety	-.26***	.49***
DASS-21 Stress	-.27***	.59***
WHOQOL – Physical health	.45***	-.48***
WHOQOL – Psychological health	.64***	-.61***
WHOQOL – Social relationships	.42***	-.39***
WHOQOL – Environment	.38***	-.33***
Concurrent validity (Sample 3; $N = 169$)		
AAQ-II	-.480***	.626***
VLQ - Importance	.31***	-.06
VLQ - Consistency	.41***	-.31***
ELS – Valued Living	.59***	-.54***
ELS – Life Fulfillment	.62***	-.57***

VQ = Valuing Questionnaire; CFQ = Cognitive Fusion Questionnaire; MAAS = Mindfulness Attention Awareness Questionnaire; SCS = Self Compassion Scale; AAQ-II = Acceptance and Action Questionnaire; DASS-21 = Depression, Anxiety, Stress Scale; WHOQOL = World Health Organization Quality of Life; VLQ = Valued Living Questionnaire; ELS = Engaged Living Scale.

Note. *** $p < .001$

Table 4. Hierarchical multiple regression: incremental validity analyses prediction of depression, anxiety and stress (Sample 3; N = 169).

Predictor	Depression			Anxiety			Stress		
	β	t	ΔR^2	β	t	ΔR^2	β	t	ΔR^2
Step 1									
AAQ-II	.63***	10.53	.40***	.41***	5.82	.17***	.61***	9.82	.37***
Step 2									
AAQ-II	.57***	9.42	.06***	.41***	5.58	.04*	.56***	8.91	.05**
VLQ - Importance	.19*	3.04		.21*	2.76		.21**	3.18	
VLQ - Consistency	-.26***	-3.97		-.09	-1.15		-.22**	-3.23	
Step 3									
AAQ-II	.43***	6.55	.07***	.40***	4.69	.01	.53***	7.33	.02
VLQ - Importance	.17**	2.82		.20*	2.54		.19**	2.91	
VLQ - Consistency	-.15*	-2.26		-.08	-.93		-.19**	-2.64	
ELS – Valued Living	.02	.31		.12	1.28		.11	1.36	
ELS – Life Fulfillment	-.34***	-4.47		-.14	-1.42		-.18*	-2.09	
Step 4									
AAQ-II	.33***	4.61	.03***	.35***	3.78	.02	.43***	5.56	.04**
VLQ - Importance	.17**	2.81		.16	1.98		.15*	2.25	
VLQ - Consistency	-.15*	-2.23		-.08	-.95		-.19*	-2.69	
ELS – Valued	.09	1.20		.12	1.18		.14	1.65	

Living						
ELS – Life Fulfillment	-.26*	-3.22	-.16	-1.51	-.16	-1.80
VQ - Progress	-.11	-1.46	.15	1.57	.12	1.49
VQ - Obstruction	.22***	2.93	.16	1.62	.27**	3.36
Total R ²	.56***	.24***	.47***			

Note. *** $p < .001$, ** $p < .005$, * $p < .05$; AAQ-II = Acceptance and Action Questionnaire; VLQ = Valued Living Questionnaire; ELS = Engaged Living Scale; VQ = Valuing Questionnaire.

AAQ-II = Acceptance and Action Questionnaire; VLQ = Valued Living Questionnaire; ELS = Engaged Living Scale; VQ = Valuing Questionnaire.

Highlights

- The Valuing Questionnaire (VQ) two-factor structure is confirmed;
- VQ presents measurement invariance between chronic pain (CP) and general population;
- VQ is temporally stable (6-months) in a CP sample;
- VQ-Obstruction subscale predicts depression and anxiety beyond AAQ-II, ELS and VLQ.